1. A carbon nanotube device comprising:

a support structure including an aperture extending from a front surface to a back surface of the structure; and

at least one carbon nanotube extending across the aperture and accessible through the aperture from both the front surface and the back surface of the support structure.

2. The device of claim 1 wherein the carbon nanotube comprises a single-walled carbon nanotube.

3. The device of claim 1 wherein the carbon nanotube comprises a multi-walled carbon nanotube.

4. The device of claim 1 wherein the carbon nanotube comprises a semiconducting carbon nanotube.

5. The device of claim 1 wherein the carbon nanotube comprises a metallic carbon nanotube.

6. The device of claim 1 wherein the at least one carbon nanotube comprises a plurality of carbon nanotubes.

7. The device of claim 1 wherein the support structure comprises a substrate.

8. The device of claim 7 wherein the support structure comprises a semiconducting substrate.

9. The device of claim 1 wherein the support structure comprises a membrane.

10. The device of claim 9 wherein the membrane comprises a silicon nitride membrane.

11. The device of claim 9 wherein the membrane comprises a silicon dioxide membrane.

12. The device of claim 1 wherein the support structure is aligned between a source of electrons and an electron detector for transmission electron microscopy of the carbon nanotube.

13. The device of claim 1 further comprising at least one pair of electrically conducting contact pads disposed on the support structure and separated by the aperture, with each end of a carbon nanotube located at a contact pad.

14. The device of claim 13 wherein each carbon nanotube end disposed on top of a contact pad.

15. The device of claim 13 wherein the at least one pair of electrically conducting contact pads comprises a plurality of pairs of contact pads disposed at locations around the aperture.

16. A method for fabricating a carbon nanotube device comprising:

providing a support structure;

forming at least one carbon nanotube catalyst region on a surface of the support structure;

forming an aperture from a front surface to a back surface of the support structure adjacent to the catalyst region; and

exposing the catalyst region to a hydrocarbon gas, synthesizing across the aperture a carbon nanotube that is accessible from both the front surface and the back surface of the support structure.

17. The method of claim 16 wherein forming a carbon nanotube catalyst region comprises vapor depositing a catalyst material and lithographically patterning the deposited catalyst material to define the catalyst region.

18. The method of claim 17 wherein vapor depositing a catalyst material comprises thermal evaporation of a catalyst material.

19. The method of claim 18 wherein vapor depositing a catalyst material comprises thermal evaporation of Fe.

20. The method of claim 16 wherein forming a carbon nanotube catalyst region comprises forming a catalyst region of less than about 2 nm in thickness.

21. The method of claim 16 wherein the carbon nanotube catalyst region is formed to substantially abut the aperture.

22. The method of claim 16 wherein the at least one carbon nanotube catalyst region comprises at least one pair of carbon nanotube catalyst regions.

23. The method of claim 16 wherein the support structure comprises a substrate.

24. The method of claim 16 wherein the support structure comprises a membrane.

25. The method of claim 16 further comprising forming an electrically conducting contact pad under the carbon nanotube catalyst region on the support structure surface.

26. The method of claim 25 wherein forming an electrically conducting contact pad comprises depositing a layer of metal and etching the metal layer to form a contact pad prior to forming the carbon nanotube catalyst region on the contact pad.

27. The method of claim 16 wherein the hydrocarbon gas to which the catalyst region is exposed comprises substantially only methane.

28. The method of claim 27 wherein the methane gas is supplied at a flow rate of less than about 400 sccm.

29. The method of claim 27 wherein the catalyst region exposure to methane is carried out at a temperature of less than about 1500 °C.

30. The method of claim 16 wherein the catalyst region exposure to hydrocarbon gas further comprises applying an electric field across the aperture in a direction corresponding to a desired nanotube synthesis direction.